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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/758,269	01/12/2001	Satoshi Iuchi	3914-3	9211
23117	7590	10/04/2004	EXAMINER	
NIXON & VANDERHYE, PC 1100 N GLEBE ROAD 8TH FLOOR ARLINGTON, VA 22201-4714			COLLINS, CYNTHIA E	
			ART UNIT	PAPER NUMBER
			1638	

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/758,269

Applicant(s)

IUCHI ET AL.

Examiner

Cynthia Collins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on July 20, 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,5-14 and 17-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 11,14 and 20 is/are allowed.
- 6) ☒ Claim(s) 1,5-10,12,13 and 17-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed June 21, 2004 in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on September 23, 2003, June 21, 2004, and July 20, 2004 have been entered.

In Applicant's submission filed on September 23, 2003, claims 2-4 are cancelled, claims 1, 7, 14 and 19 are currently amended, claim 23 is new, and claims 1 and 5-23 are pending.

In Applicant's submission filed on June 21, 2004, claims 2-4, 15-16 and 21-23 are cancelled, claims 1, 7, 9-10, 12 and 19 are currently amended, and claims 1, 5-14 and 17-20 are pending.

In Applicant's submission filed on July 20, 2004, claims 2-4, 15-16 and 21-23 are cancelled, claims 10, 14 and 20 are currently amended, and claims 1, 5-14 and 17-20 are pending.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

All previous objections and rejections not set forth below have been withdrawn.

***Claim Rejections - 35 USC § 101***

Claim 11 is rejected under 35 USC 101 because the claimed invention is directed to non-statutory subject matter.

The claim is drawn to a propagation material for the transgenic plant of claim 6.

Claim 11, as written, does not sufficiently distinguish over plant propagation materials as they exist naturally because the claims do not particularly point out any non-naturally occurring products. In the absence of the hand of man, the naturally occurring products are considered non-statutory subject matter. See Diamond v. Chakrabarty, 447 U.S. 303, 206 USPQ 193 (1980). The claims should be amended to indicate the hand of the inventor, e.g., by indicating that the propagation material comprises the isolated DNA of claim 1. See MPEP 2105.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Wu et al. (U.S. Patent No. 5,981,842, issued November 9, 1999).

The claim is drawn to a propagation material for the transgenic plant of claim 6.

Wu et al. teach propagation material for the transgenic plant (column 9 lines 30-49).

While Wu et al. do not explicitly teach that their material is “for the transgenic plant of claim 6”,

Wu et al. need not teach that their material is for the transgenic plant of claim 6. The limitation

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“for the transgenic plant of claim 6” is interpreted as being an intended use for the propagation material, such that any plant propagation material that could be transformed and produce a transgenic plant would anticipate the rejected claim. Amendment of the claim as suggested in the rejection under 35 USC 101 would overcome this rejection also.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (U.S. Patent No. 5,981,842, issued November 9, 1999) in view of Tan et al. (Proc. Natl. Acad. Sci. USA, October 1997, Vol. 94, pages 12235-12240, Applicant's IDS, and Accession No. ZMU95953, 04 July 1997, Applicant's IDS) and Swamy et al. (Current Science, 10 May 1999, Vol. 76, No. 9, pages 1220-1228) .

The claims are drawn to a method for increasing tolerance to a stress selected from the group consisting of drought, high salt and low temperature stresses in a plant, wherein said method comprises: (a) introducing an isolated DNA encoding a protein having neoxanthin cleavage activity into a plant cell obtained from said plant; (b) expressing the isolated DNA in said plant cell; and (c) producing a plant from the plant cell that has increased stress tolerance.

Wu et al. teach a method for increasing tolerance to a stress selected from the group consisting of drought and high salt, wherein said method comprises: (a) introducing an isolated

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DNA encoding a group 3 late embryogenesis abundant protein into a cereal plant cell; (b) expressing the isolated DNA in said plant cell; and (c) producing a cereal plant from the plant cell that has increased tolerance to drought and high salt (columns 19-20). Wu et al. also teach that the generation of such stress-tolerant crops using transgenic approaches is desirable because environmental stresses such as drought, increased salinity of soil, and extreme temperature are major factors in limiting plant growth and productivity (column 1 lines 22-39). Wu et al. additionally teach that expression of the barley group 3 LEA protein used in their method is rapidly induced in young seedlings by ABA and several stress conditions including dehydration, salt, and extreme temperature (column 2 lines 39-46). Wu et al. further teach that there is a correlation between LEA gene expression or LEA protein accumulation with stress tolerance in a number of plants, since the timing of LEA mRNA and protein accumulation is associated with elevated in vivo abscisic acid (ABA) levels, and since the expression of LEA genes is also induced in vegetative tissues by ABA and various environmental stresses such as drought, salt, and extreme temperature (column 2 line 47 to column 3 line 15).

Wu et al. do not teach a method comprises introducing an isolated DNA encoding a protein having neoxanthin cleavage activity into a plant cell obtained from said plant.

Tan et al. teach an isolated DNA encoding a maize VP14 protein having neoxanthin cleavage activity (Accession No. ZMU95953; page 12236 column 1 *Isolation of vp14* ; 12238 Figure 4). Tan et al. also teach that the maize VP14 protein is a dioxygenase responsible for the oxidative cleavage of 9-cis-xanthophylls to xanthoxin, and that biochemical studies suggest that cleavage of 9-cis-xanthophylls is the key regulatory step in the ABA biosynthetic pathway (page 12238 column 2 second full paragraph; page 12235 column 1 second full paragraph). Tan et al.

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additionally teach that vp14 expression is induced in leaves by drought stress (page 12239 Figure 6).

Swamy et al. teach that environmental stresses like cold, drought, desiccation, salt and mechanical wounding induce the synthesis of the plant hormone ABA, which upon synthesis plays a cardinal role in plant adaptation to stresses (abstract; page 1220 column 2 last paragraph through page 1221 column 2 first full paragraph; page 1225 paragraph spanning columns 1 and 2). Swamy et al. teach that exogenous application of ABA also increases plant adaptive responses to stress: application of exogenous ABA to resurrection plant callus enables the callus to survive severe dehydration, application of exogenous ABA to tobacco suspension cell cultures induces their adaptation to salt stress, and application of exogenous ABA to plant callus explants and plant cell suspension cultures increases their cold tolerance (page 1221 column 2 second, third and fourth full paragraphs).

Given the success of Wu et al. in making drought and salt stress tolerant cereal plants by using an isolated DNA encoding a group 3 late embryogenesis abundant (LEA) protein, given the teaching of Wu et al. that the expression of LEA proteins is induced by ABA, given the teaching of Swamy et al. that increased ABA levels result in increased plant tolerance to stresses like cold, drought, desiccation, salt and mechanical wounding, and given the teaching of Tan et al. that the maizeVP14 protein is a dioxygenase responsible for the oxidative cleavage of 9-cis-xanthophylls and that biochemical studies suggest that cleavage of 9-cis-xanthophylls is the key regulatory step in the ABA biosynthetic pathway, it would have been prima facie obvious at the time the invention was made to make drought, salt and low temperature stress tolerant plants by substituting the isolated DNA encoding the maize VP14 protein taught by Tan et al. for the

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isolated DNA encoding a group 3 late embryogenesis abundant (LEA) protein in the method taught by Wu et al. One skilled in the art would have been motivated to do so in order to counteract the deleterious effects of environmental stresses on plant growth and productivity. One skilled in the art would have had a reasonable expectation of success given the well established effects of ABA accumulation on plant stress tolerance and on LEA protein expression, and given that the maizeVP14 protein functions at the key regulatory step in the ABA biosynthetic pathway.

***Remarks***

Claims 11, 14 and 20 are rejected.

Claims 1, 5-10, 12-13, and 17-19 are allowable.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Collins whose telephone number is (571) 272-0794. The examiner can normally be reached on Monday-Friday 8:45 AM -5:15 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson can be reached on (571) 272-0804. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cynthia Collins

*Cynthia Collins 9/30/04*